

**Association between Weight Discrimination and Program Adherence in a
Clinical Weight Management Program**

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A THESIS SUBMITTED TO THE FACULTY OF GRADUATE STUDIES IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

GRADUATE PROGRAM IN KINESIOLOGY AND HEALTH SCIENCE

YORK UNIVERSITY

TORONTO, CANADA

SEPTEMBER 2016

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ABSTRACT

Background: Weight stigma is a common occurrence for those living with obesity. While the detrimental effects of weight stigma on health are well known, it is unclear if it also impacts on adherence (and levels of compliance) within a medically supervised weight loss setting.

Method: Participants from a local weight loss clinic completed a battery of weight discrimination questions at their first site visit (n=120) and were tracked for program adherence.

Results: Although the majority of patients (77.5%) experienced weight discrimination, no differences in treatment time were observed. At the end of one month, significantly more of the discriminated group remained in the program (no weight discrimination: 22.2%; weight discrimination: 46.2%), an effect that diminished with time.

Conclusion: Results suggest that the prevalence of weight discrimination in a clinical weight loss setting is high, but did not directly impact on program adherence or weight loss outcomes.

ACKNOWLEDGEMENT

The main part of data for this study was initially collected by Saaqshi Sharma, M.Sc. as part of the research study: *Influence of weight discrimination on weight loss goals and self-selected weight loss interventions*. Additional data for follow-up was then added from the Wharton Medical Clinic dataset available for research purposes. Drs. Sean Wharton and Jennifer Kuk are the primary investigators, and Chris Ardern is a co-investigator. Funding for initial data collection at the clinic was provided by a Mitacs Accelerate grant.

TABLE OF CONTENTS

| | |
|--|------------|
| ABSTRACT..... | ii |
| ACKNOWLEDGEMENT..... | iii |
| TABLE OF CONTENTS..... | iv |
| LIST OF TABLES..... | vi |
| LIST OF FIGURES..... | vii |
| 1.0. GENERAL INTRODUCTION..... | 1 |
| Weight bias and stigma..... | 2 |
| Prevalence and predictors..... | 3 |
| Health consequences of weight discrimination..... | 6 |
| Bariatric care..... | 8 |
| Wharton Medical Clinic..... | 9 |
| Factors related to drop-out in weight loss interventions..... | 9 |
| Conceptual model of factors related to attrition..... | 11 |
| Study rationale..... | 13 |
| 2.0. MANUSCRIPT..... | 24 |
| Summary..... | 25 |
| Introduction..... | 26 |
| Methods..... | 27 |
| Participants..... | 27 |
| Questionnaire..... | 28 |
| Statistical analysis..... | 29 |
| Results..... | 29 |

| | |
|---|-----------|
| Discussion..... | 31 |
| Strengths and limitations..... | 34 |
| Conclusion..... | 35 |
| 3.0. EXTENDED DISCUSSION..... | 43 |
| Study limitations and sources of bias..... | 43 |
| Measure of weight stigma/ discrimination..... | 43 |
| Confounding bias..... | 44 |
| Selection bias and ethics..... | 45 |
| External validity..... | 45 |
| Sample size considerations..... | 46 |
| Bradford Hill’s criteria for causation..... | 46 |
| Implications and future directions..... | 47 |
| 4.0. APPENDICES | |
| Appendix A. Study Questionnaire..... | 55 |

LIST OF TABLES

| | |
|--|----|
| Table 1. Baseline Characteristics of the Sample..... | 50 |
| Table 2. Beta Coefficient and P-value for Individual Covariates (model 1) and Adjusted Models (model 2)..... | 52 |

LIST OF FIGURES

| | |
|---|----|
| Figure 1. Adapted Model of Predictors of Patient Attrition in Weight Loss Interventions..... | 12 |
| Figure 2. Type and Characteristics of Perpetrators of Weight Discrimination..... | 53 |
| Figure 3. Difference in Adherence According to History of Weight Discrimination..... | 54 |

1.0. GENERAL INTRODUCTION

Overweight and obesity are defined as abnormal or excessive body fat that may impair health and can be operationalized at the population-level by Body Mass Index (BMI). A BMI over 25 kg/m² is defined as overweight and a BMI over 30 kg/m² is defined as obese in adults. Overweight and obesity are a globally increasing problem even in low and middle income countries. According to a 2014 report from the World Health Organization (WHO), more than 1.9 billion adults aged 18 years and older were overweight, over 600 million of whom were obese. The worldwide prevalence of obesity more than doubled between 1980 and 2014 (1). In the U.S., more than two-thirds (68.8 percent) of adults in 2009-2010 had a BMI over 25 kg/m², 35.7% of whom were living with obesity (2). Similarly, in 2014, more than one fifth of Canadians age 18 y and older (20.2% or 5.3 million adults) were obese (3).

Within Canada, the rate of obesity is increasing in both men and women, and across all regions. For example, the prevalence of obesity increased approximately 35% between 2003 (16.0%) and 2014 (21.8%) in men, and 29% in women (2003: 14.5%; 2014: 18.7%) (3). At the same time, the prevalence of overweight has remained relatively stable (M: 40.0%; F: 27.5%), suggesting that the increase in average BMI may be largely accounted for at the extremes of the distribution. In general, there is a west-to-east gradient of increasing BMI across Canada. Among the different provinces, Quebec and British Columbia were below the national average for obesity, while Northwest Territories (33.7%), Newfoundland and Labrador (30.4%), Nova Scotia (27.8%), New Brunswick (26.4%), Saskatchewan (25.1%) and Manitoba (24.5%) were above the national average (3). In sum, 61.8% of men (8.2 million) and 46.2% of women (6.1 million) were classified as obese or overweight and therefore had increased health risks because of excess weight (3).

Indeed, increasing BMI is associated with a higher risk of cardiovascular diseases (heart disease and stroke), diabetes, musculoskeletal disorders (especially osteoarthritis), some cancers (including endometrial, breast, ovarian, prostate, liver, gallbladder, kidney, and colon), as well as respiratory difficulties, infertility and gallbladder disease, among others (1). Overweight and obesity are also a leading cause of premature death (4) and the target of both medically supervised and non-supervised weight loss efforts. Current guidelines for the management of obesity indicate that clinically meaningful reductions in health risk can occur with as little as a 5% weight loss (5), and at any given time, 47.5% of men and 66.2% of women (6) are trying to lose weight. However, long-term maintenance of weight loss is only achieved in ~ 5% of the population (7), leading to the phenomenon of weight cycling and physiological defense of one's highest weight (8). Although the causes of overweight and obesity are multifactorial (9), it remains a condition that is largely misunderstood by the general population (10) and highly stigmatized (11) due to the belief that obesity is in large part the consequence of one's own actions (10).

Weight Bias and Stigma

In addition to above-mentioned physical adverse effects of obesity, individuals with obesity often experience negative psychological burden as well (12). Although the causes are likely inter-related and unique to the individual, factors such as: knowledge of the medical complications of obesity, body dissatisfaction and conflicts with one's ideal self-image, physical limitations, and aesthetics are believed to be involved (12, 13). Moreover, perceptions of weight bias, discrimination and negative attitudes from peers and society at large may place a further burden on individuals who are living with obesity (14, 15, 16).

While far from uniform, weight stigma is often experienced as the sensation of shame and blame or bullying that is inflicted on overweight people because of their weight. As a consequence, individuals living with obesity have reported experiencing workplace (17, 18), social and financial discrimination and bias (19, 20), and prejudice within the healthcare setting (21-25), education centers (26-28), and even amongst family and friends (29). This kind of bias can be both subtle and obvious. In its most overt sense, individuals with overweight and obesity are prone to be socially rejected and labeled as lazy and are usually assumed by the society to deserve the consequences of obesity because of their own behavior (30, 31). In this respect, individuals living with obesity commonly report instances of bullying, including being insulted, victimized, or ignored (19, 20, 30). They also report being treated with less courtesy compared to the thinner people (20, 30, 32) and may face discrimination or unfair treatment for the mere reason of appearing “overweight”.

Prevalence and Predictors

Studies on the common characteristics of victims of bullying have noted some general personality traits (33, 34) that may be applicable to weight stigma. Specifically, most of the studies on schoolyard or workplace bullying show that victims have a lower self-esteem and social competency, higher level of insecurity, a tendency to withdraw, and isolation compared to non-victims (35, 36). While it’s been reported that most of the bullies have high levels of aggression and high, but unstable, self-esteem and low social competence (35), there is a commonly held belief that they usually choose victims who are different from the others in some way so they can easily isolate them. In this way, being overweight or obese is a characteristic that bullies can easily identify to target someone.

Data suggest that the problem of weight discrimination has been increasing with time, to mirror the increasing prevalence of overweight and obesity in the U.S. (1, 37). Indeed, between 1995-1996 and 2004-6, the prevalence of weight discrimination increased from 7% to 12%, a 66% increase in all age groups except older adults (37). In a study by Puhl et al. (32), patterns and prevalence of body weight and height discrimination were reported in a large, ethnically diverse sample of U.S. adults. Overall, weight or height discrimination was experienced by 5% of men and 10% of women; however, these results obscured the much higher risk of weight discrimination among heavier individuals (40% for adults with a BMI of 35 and above). Regardless of their ethnicity or education, younger adults with a high BMI had a particularly high risk of weight/height discrimination. Women also seem to be at a greater risk for weight/height discrimination than men in all age and education groups, a rate which approached that of racial discrimination in the broader U.S. population (32). Moreover, in this study, women with a BMI of 30 to 35 had three times greater likelihood of reporting weight/height discrimination compared to male peers of a similar weight.

In another study by Puhl et al. (29), the prevalence of weight stigma was investigated in a large sample of overweight and obese adults. Using a modified version of Myers and Rosen's Stigmatizing Situations Inventory (1999) to assess experiences of weight stigma (16), the results showed that in an initial sample of 2449 women, 50% of women had experienced 40% of all the stigmatizing situations described at least once in their lives. The most common stigmatizing situations reported by participants were others making negative assumptions (e.g., others having low expectations of you because of your weight), receiving nasty comments from children, encountering physical barriers and obstacles (e.g., public accommodations being too small), encountering inappropriate comments from doctors, and receiving negative comments from

family members). Experiencing stigma was positively correlated with BMI, suggesting that as weight increases, more stigma is experienced. When both men and women were considered in a matched analysis (M: n=111; F: n=111), 35% of the situations were experienced by at least 50% of women, whereas 48% of the situations were reported by at least 50% of the men; however, there were no significant sex differences with respect to types of stigma experienced. Nonetheless, childhood weight was positively related to stigma for women but not for men. Unlike the larger female only sample, BMI was not related to a higher number of stigmatizing situations in the matched sample. For women, but not men, younger individuals were more likely to report experiencing negative comments from children. Several recent studies have also examined weight discrimination in employment settings using data from the National Survey of Midlife Development in the United States (MIDUS), a nationally representative sample of adults aged 25–74 years. Here again, compared to normal weight respondents (OR=1.00, referent), employees living with overweight (OR~12), obesity (OR~37), or severe obesity (OR~100) experienced employment-related discrimination at a dramatically higher rate. In addition, women were 16 times more likely to report weight-related employment discrimination than men (38). Within the healthcare setting, weight discrimination has been reported in 77% of patients of a Canadian medical weight loss clinic (39). In this study, those who experienced weight discrimination tended to be younger and have a higher weight than those reporting no discrimination. When taken together, these studies suggest that the experience of weight discrimination may vary by social setting and be amplified by other personal factors such as the degree of perceived excess weight.

Finally, it is interesting to note that individuals living with overweight or obesity may also experience greater rates of *all types* of discrimination. Carr et. al. (40) examined self-

acceptance and different sources of discrimination in overweight and obese compared with normal weight group. Reasons for discrimination included the participant's race, ethnicity, gender, age, religion, physical appearance, sexual orientation, or other characteristic, and included a range of social, educational, health care and occupational settings (40). The results showed that individuals with class II or III obesity reported significantly lower self-acceptance scores (5.22 vs. 5.56; $p \leq .001$), more frequent daily discrimination (defined as character assaults and unkind treatment; 1.58 vs. 1.39; $p \leq .001$), and were more likely to report experiences of any major discrimination (41% vs. 33%; $p \leq .001$) than those with a normal weight BMI. A dose-response relationship was also present wherein individuals living with higher levels of obesity were more likely to experience any experience of major discrimination (Class I: OR=1.40; Class II/III: OR=1.50) or day-to-day interpersonal discrimination (Class I: OR=1.30; Class II/III: OR=1.70), compared to persons of normal weight.

Health Consequences of Weight Discrimination

Accumulating research suggests that weight bias can promote adverse physical (14, 41, 42) and psychological (15, 43) outcomes. Indeed, individuals with overweight and obesity who are exposed to weight stigma are at greater risk for adverse psychological outcomes including depression, anxiety, suicidal ideation, negative body image, and reduced self-esteem (44). In addition, weight stigma may promote unhealthy eating behaviors such as binge eating, increased caloric consumption, and reluctance to diet (44, 45), while also attenuating physical activity and motivation to exercise (46, 47), all of which impair weight loss efforts and promote obesity. Although the mechanisms are not fully known, one possible pathway between weight bias and poorer health is through further weight gain (41). Schvey et al. (41) have examined the effect of exposure to weight stigma on neuroendocrine stress responses. In this study, regardless of body

weight, women who were exposed to weight stigma had a greater stress response (and consequently cortisol secretion), a hormone implicated in weight gain (41). On the other hand, Major et al. (14) suggest that weight stigma may deplete a person's resources and mindfulness regarding self-control and self-regulation of weight (14). As a whole, weight discrimination increases obesity risk (48, 49), chronic inflammation (50), and disease burden (51), and many of the diseases associated with obesity (e.g., hypertension, diabetes, CVD) are stress-related diseases that may develop or exacerbate, in part, from the stress of discrimination (52).

The effects of weight discrimination may also extend beyond the aforementioned physical and psychological distress to mortality risk (42). Indeed, the increases in mortality risk amongst those who experience weight bias are higher than what is generally reported for age-, sex-, and race-related discrimination (42). In the study by Sutin et al. (42), perceived weight discrimination was associated with a 60% increase in mortality among individuals with obesity who experienced weight discrimination. This association was attenuated, but not eliminated through the inclusion of sociodemographic (age, race, sex, and education) as well as clinical and behavioral factors (BMI, subjective health, and disease burden, depressive symptoms, smoking history and physical activity).

Although the exact mechanisms involved in the increased morbidity and mortality amongst those who experience weight discrimination is not yet clear, it is believed that weight stigma may adversely impact on behaviors such as: avoiding preventive health-care services (53), engaging in unhealthy eating patterns (54, 55) and avoiding physical activity (56-58), which may in part be due to increases in social isolation (59). Weight discrimination may also lead to higher weight loss goals and use of more dangerous, and more aggressive methods of

weight loss (39), which may in turn contribute in higher mortality rate in weight discriminated patient.

Bariatric Care

While it is beyond the scope of this thesis to provide a complete review of obesity management options, some important distinctions in bariatric care are worth noting. Obesity management programs are typically based on lifestyle changes which include eating fewer calories and engaging in more physical activity. Medicine and bariatric surgery are next options if lifestyle changes aren't sufficient, but are dependent on the number of comorbidities and other precipitating factors (60). It is believed that in most individuals with obesity, a 6 month weight loss goal of 5-10% of their current weight is realistic (60). If a patient has lost 10% of his or her initial weight, kept it off up to 6 months, and are still overweight or obese, further weight loss can then be considered (60).

In Ontario, a selected number of obesity medical clinics are now in operation and will accept patients with family doctor referral. In these clinics all the bariatric management services are covered by the Ontario Health Insurance Plan (OHIP). These services include: physician visits, bariatric education and counselling, calorimetry, and diagnostic testing such as blood work and electrocardiography. Patients also attend educational sessions administered by physicians, dietitians, behavioural therapists, and exercise specialists. Wharton Medical Clinic (WMC) is a unique and well-known bariatric management clinic located mainly in the Great Toronto and Hamilton Area (61). Bariatric surgery is also covered by OHIP in case when a patient is referred for the surgery by a bariatric clinic. There are also a number of weight loss programs (e.g. self-help groups or non-referral based weight loss medical programs) which also focus on lifestyle change in regards to healthier eating and physical activity.

Wharton Medical Clinic:

In the WMC, the 3 month adherence rate is ~40%, while only 10% of patients will remain in the program at 3 months (61). This is despite the fact that the WMC is a referral-based, OHIP paid medical program, which means that the majority of the work done in this clinic will be free for to patients. Nonetheless, the funding and recruitment structure of the WMC provides a unique opportunity to investigate the reasons for program drop-out beyond patient socio-economic status.

Factors Related to Drop-Out in Weight Loss Interventions:

Amongst the many factors that may be related to long-term weight loss success (of a 5-10% weight loss goal) is greater adherence to the medical weight loss programs (62, 63, 64). Despite this, attrition (and non-adherence) to weight maintenance programs is generally high, and varies according to population, level of support, length of follow-up, and type of treatment employed (i.e. pharmacotherapy, behavioral therapy, bariatric surgery, etc.). Of note, almost all community-based weight loss clinics report a high level of attrition rates, ranging from 10% to 80% (65). These conflicting results are partly due to the different type and length of treatment, and partly to the definition of attrition (66). Overall, factors such as baseline BMI, age, gender, dieting and behavioral variables, body fat distribution, binge eating, and depression have been found to be associated with attrition (67), but results are not consistent across studies. For example, in a large clinic-based weight loss program, Honas et al. (66) found that the overall attrition rate for the 16-week program was 31%. The study measured the attrition rate based on different factors: sex, race, marital status, age, BMI, and treatment protocol. After adjusting for confounders, the only significant risk factor for attrition was found to be young age (<50 years). The reasons of these conflicting results are not entirely known, but it is possible that some

factors are predictive of attrition only in patients undergoing specific treatments, and not in those enrolled in other programs that adopt different procedures and strategies (66); however, most study results are consistent with this finding that younger age was one the most important predictor of dropout (64, 68). In line with results from Honas' study, data from the Wharton Medical Clinics in Ontario suggest that early attrition (<6 months) is higher in younger patients, current smokers, and those of Asian ancestry (69).

A recent meta-analysis of weight loss studies examined pre-treatment factors, mode of treatment and response information and found that practical difficulties, unsatisfactory results, psychological factors and type of treatment seem to play a crucial role in the patients' attrition (65). In total, more than half of the reported reasons for weight program attrition were related to challenges which can arise from organizational or physical barriers, as well as unsatisfactory weight loss results (67, 70). For example, in a study by Grave et al. (71) both "dream" weight and maximum acceptable weight largely exceeded the weight loss target recommended by international guidelines (5), and in another study, higher weight loss expectations were the strongest predictors of attrition at long-term follow-up (68). This may be explained in part by the strong correlation between the difference in weight loss goals and treatment-induced weight loss with post-treatment satisfaction (72). The higher the difference, the greater the weight dissatisfaction, which may contribute to frustrated patients interrupting their treatment. In this study, dissatisfactory results accounted for 25% of the dropouts (72). The type and the duration of treatment are also other important factors that are associated with attrition. Group behavioral weight loss programs applied in a research setting reported a very low attrition rate (around 13.5%), whereas higher rates of attrition (from 35% to 81.5%) have been reported in commercial and continuous care clinical setting (65). Other psychological factors that played an important

role in predicting attrition included lack of motivation, overall levels of stress, self-confidence in the ability to lose additional weight without professional help, and sense of abandonment from therapists. However, because the psychological obstacles associated with weight loss treatment are rarely addressed in the clinic setting, ensuring that weight loss expectations are realistic may be a key factor in weight program adherence.

Conceptual Model of Factors Related to Attrition

On the basis of the above, a modified framework by Grave et al. (65) has been proposed as the working model for how weight stigma may contribute to weight loss program attrition (**Figure 1**). According to Grave et al. (65), predictors of patients' attrition can be divided in two major groups which include patients' pre-treatment variables and (in) treatment variables.

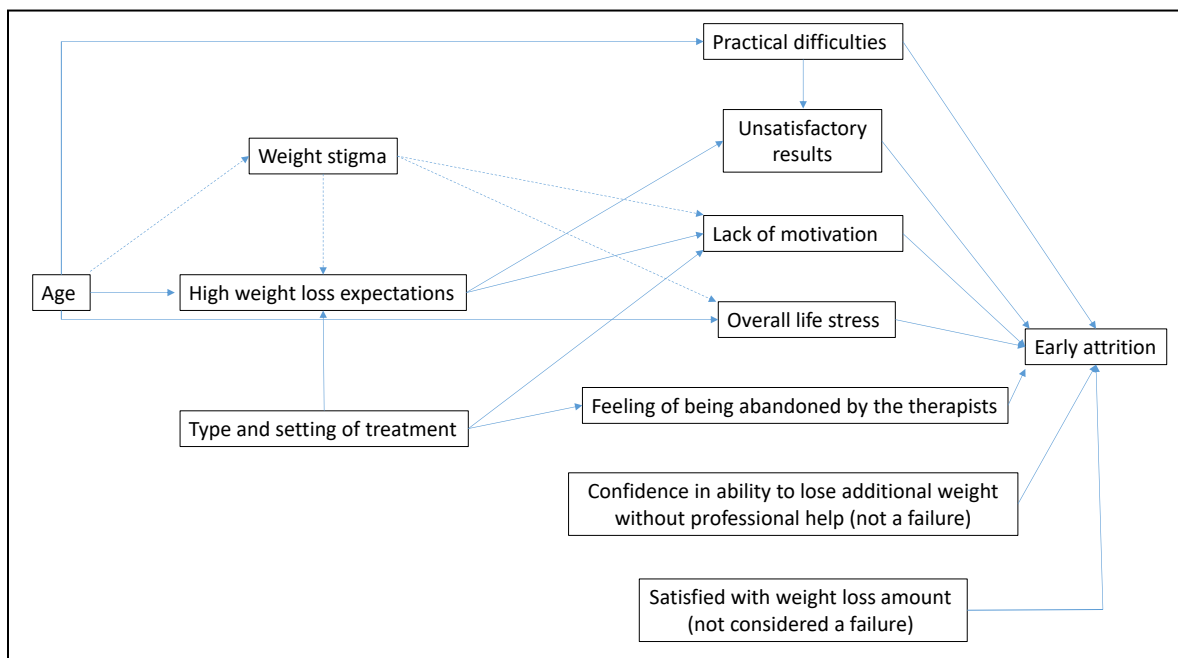
Pre-treatment variables:

- 1) Demographic variables: age, age at onset of obesity, female gender and full-time employment.
- 2) Anthropometric variables: BMI, waist circumference, etc.
- 3) Dieting and other behavioral variables: lower age at first dieting, number of previous weight loss attempts, higher level of dietary restraint, dietary habits, smoking and sedentary habits.
- 4) Psychological variables: high weight loss expectations, lack of motivation, binge eating, depression and stress of life, satisfaction with weight loss amount, confidence in the ability to lose additional weight without professional help, and feeling of being abandoned by care providers or therapists.
- 5) Medical variables and quality of life: higher number of obesity related diseases including high blood pressure, lower level of physical, mental and weight related quality of life.

Patient Treatment Variables:

- 1) Practical difficulties: interference with working activities and daily life, family problems, problems at work, distance problem, and health problems other than obesity.
- 2) Unsatisfactory results: slow weight loss (especially modest initial weight loss), which inter-relates with high and unrealistic weight loss expectations.
- 3) Type and setting of treatment: e.g. group behavioral weight loss programs has a higher adherence vs. commercial and continuous care clinical setting; cognitive behavioral therapy may have better adherence (through goal-setting, motivation, and direct assistant with weight-related mood disorders).

Figure 1. Adapted Model of Predictors of Patient Attrition in Weight Loss Interventions



Study Rationale:

Existing literature support a positive association between adherence and weight loss success, but little is known about the potential influence of weight stigma. This warrants an effort in obesity management clinics to identify the patients who are at a higher risk of attrition and be prepared to address their specific problem. In this study we aimed to assess if perception of weight stigma and discrimination have any effect on the adherence to a medically supervised weight loss program at the Wharton Medical Clinic.

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2.0. *MANUSCRIPT:* Association between Weight Discrimination and Program Adherence in a
Clinical Weight Management Program

This manuscript is a secondary analysis of data originally collected by Saaqshi Sharma, M.Sc., and includes data linkage to the Wharton Medical Clinic in a project supervised by Drs. Sean Wharton, M.D., Ph.D. (Wharton Medical Clinic) and Jennifer Kuk, Ph.D. (York University). Data management, statistical analysis, and writing of this secondary analysis was conducted by Neda Yeganeh under the supervision of Prof. Chris Ardern (York University).

SUMMARY

Background: Obesity is a leading cause of morbidity and mortality and is known to have pervasive psychological and functional health consequences that impair quality of life. Weight stigma and bias, a common occurrence for those living with obesity, may exacerbate existing health concerns. However, to date, there is no data on the effect of weight discrimination on adherence to the weight loss programs, an increasingly important strategy for weight loss success. The purpose of this study was to therefore examine the effect of weight stigma on adherence to these programs in an obesity management clinic in Toronto. **Method:** Participants were drawn from the Wharton Medical Clinic in Burlington and Hamilton, Ontario who provided written informed consent and completed a battery of weight discrimination questions at their first site visit (n=120). In order to assess the relationship between a history of weight discrimination (yes/no) and program adherence (months and number of program visits), a series of general linear models were used, adjusting for body mass index, age, sex, and smoking status. **Results:** Overall, no significant difference in treatment time between groups was observed (no wgt dis: 4.3 months; wgt dis: 2.8 months, $p=0.23$); however, at the end of one month, significantly more of the discriminated group remained in the program (no wgt dis: 22.2%; wgt dis: 46.2%), an effect that diminished with time. There were also no differences in the percentage of each group who achieved clinically meaningful weight loss (5% of baseline weight) within 3 months of follow-up. **Conclusion:** Results suggest that the prevalence of weight discrimination in a clinical weight loss setting is high, but did not directly impact on program adherence or weight loss outcomes. Further work is necessary to examine factors such as weight cycling and a history of depression, which may mediate the weight stigma – adherence relationship for longer-term weight maintenance.

INTRODUCTION

Overweight and obesity are leading causes of morbidity and mortality (1). Beyond a host of physical manifestations, individuals with obesity are also more likely to experience body dissatisfaction (2), psychological distress because of body image disturbance (3, 4) and disappointment for physical limitations (5). Individuals with obesity attempt weight loss frequently (6), but with little success (7). Even for those who are initially successful, relatively few (5% - 20%) (8) can maintain the weight loss longer-term, many of whom will engage in weight cycling, a series of subsequent weight increases and decreases (9). All of these factors can augment the psychological burden on excess weight on the individual (10).

As the prevalence of obesity has increased, so too has the prevalence of weight stigma and discrimination (11, 12). Individuals with obesity commonly experience social and financial discrimination and bias in the workplace (13, 14), healthcare facilities (15-19), education centers (20-22), and with family and friends (23). In its most overt sense, individuals with obesity can be bullied, insulted and socially rejected or labeled as lazy. They also report being treated with less courtesy compared to thinner people and may face discrimination or unfair treatment for the mere reason of appearing “overweight” (24, 25). In a U.S. sample, Puhl and et al. (26) found that 5% of men, and 10% of women had experienced weight discrimination, when defined as any lifetime experience of institutional or interpersonal discrimination; however, this prevalence increased markedly with body mass index (normal weight: 2.2%; overweight: 5.7%. obese I: 13.5%, and; obese II+: 39.8%).

Beyond the immediate complications of overweight and obesity, weight discrimination has been shown to independently relate to a number of adverse psychological outcomes (27-29), unhealthy eating behaviors (30, 31), and poor physical health (32). Indeed, weight discrimination

has been associated with an elevated risk of binge eating (30), increased caloric consumption and reluctance to diet (31), while also attenuates physical activity and motivation to exercise (33, 34). It has also been related to a higher risk of chronic inflammation (35), obesity-related disease burden (36), and all-cause mortality (37).

While it's well known that weight bias and stigma may discourage individuals from seeking medical attention (38, 39), it's not yet clear whether these experiences might also affect a patient's adherence to medically supervised weight loss programs. The objective of this study is to examine program adherence differences amongst those with and without a history of weight discrimination.

METHODS

Participants

Data was obtained from Wharton Medical Clinic (WMC) in Hamilton and Burlington, Ontario. WMC is a referral-based obesity management clinic that includes a team of medical doctors, medical technicians, exercise and diet specialists (40). Patients may be referred by a family doctor or specialist and all the services are covered by the Ontario Health Insurance Plan (OHIP). These services include: physician visits, bariatric and nutritional counseling, exercise assessment, diagnostic testing, standard and indicated blood work and educational group sessions. Questionnaires were completed in June, 2010, and the end of the follow-up was February, 2014. Although all new clinic patients were potentially eligible for the study, patients were not approached in a standardized manner. As a result, this study is based on an opportunistic sample of first-time Clinic patients, and no response rate can be directly estimated.

Questionnaire

Patients were given a consent form along with a questionnaire survey during their first visit to the clinic. Those who consented to participate in the study were required to complete the questionnaire and return it to the clinic with the informed consent. The questionnaire contained information about behavioral, medical, social, psychological conditions and physical activity, diet and weight loss history.

The baseline questionnaire (visit 1) contained comprehensive information regarding patients' perceptions and expectations of the treatment plans for the clinic. Patients' perceptions of factors that contribute to their obesity (overeating, high fat diet, junk food, etc.), their expectations of the ideal and realistic weight loss, and the time that they would expect to achieve that weight loss, were also collected. Patients were also asked how much weight loss they thought they would need to achieve in order to be healthy. Weight discrimination was defined by the question: "Have you ever experienced weight discrimination or had a negative experience because of your weight?" In case of the positive answer they were asked to provide details about the time of the event (childhood, adolescence, and adulthood), type of the experience (verbal, physical, discrimination, etc), gender and relationship of the perpetrator, and the location.

Additional information on socio-demographic, behavioural, and medical history were gathered by self-report. Specifically, age (y), ethnicity (White, South Asian, East Asian, African Heritage, other), and sex (M/F) were gathered to characterize the socio-demographics of the sample. Smoking was dichotomized as "current smoker" or "non-smoker (quit smoking or never smoked). Cardiovascular disease and use of blood pressure medication were self-reported (yes/no), and baseline physical activity was coded as "active" (1+ bout of activity per week) or "inactive" (no usual transportation or leisure-time activity).

After the initial consultation, patients were in regular contact with the physician and bariatric educator (once or twice monthly), and body weight was measured in each subsequent visit to assess weight changes. In each session, patients were given 20 minutes of weight management education and individualized weight management strategies for weight loss. The physician also manages causative factors and comorbidities if indicated in each session. Patients were encouraged to come to the clinic weekly to weigh themselves. In total, 120 patients provided written informed consent and had complete variables of interest for the present analysis. Adherence was defined as the length of follow up by the patient in months, and drop out was defined as not attending the clinic for 6 months.

Statistical Analysis

Baseline demographic, medical, and behavioral characteristics of participants *with* versus *without* a history of weight discrimination were compared by chi-square or independent t-tests, as appropriate. For the purpose of our descriptive analysis, short and long-term program adherence was defined as attending the clinic for 1, 2, 3, 4, 5, and 6+ months. General linear models (proc glm) were used to assess the relationship between weight discrimination and length of adherence to the program in months. Model 1 examined the independent relationship of adherence with age (years), sex (M/F), BMI (kg/m²), weight discrimination (yes/no), smoking status (yes/no) and baseline physical activity (yes/no). Model 2 mutually adjusted for all other factors in model 1.

RESULTS

A total of 120 clinic participants completed the baseline weight discrimination questionnaire and were available for follow-up. On average, clinic participants were 47.2 years

old and were largely female (83.3%), white (95.7%), and obese class II+ (39.9kg/m²) (**Table 1**). Approximately 30% were current smokers and 30% were taking antihypertensive medications. Average weight loss was 2.3% of baseline weight, with 24.7% achieving a 5% clinically meaningful weight loss over follow-up. Overall, 77.5% (n=93) of the sample had a history of weight discrimination. Overall, the average BMI (no wgt dis: 38.5 kg/m²; wgt dis: 40.3 kg/m²) and waist circumference (no wgt dis: 119.7 cm; wgt dis: 120.8 cm) did not differ significantly across groups; however, average age was approximately 8 years lower (no wgt dis: 56.4 y; wgt dis: 44.6 y, p<0.0001) and the prevalence of current smoking was 4.5 times higher (no wgt dis: 7.7%; wgt dis: 34.9%, p<0.04) in those with a history of weight discrimination. There was also a trend towards a higher percentage of White individuals (no wgt dis: 90.9%; wgt dis: 97.1%, p=0.07) and lower physically active (no wgt dis: 59.1 %; wgt dis: 38.0 %, p=0.08) amongst those with a history of weight discrimination. The weight loss goal (%) of individual patients was also significantly higher in the weight discriminated group (no wgt dis: 29.49 %; wgt dis: 34.42 %, p=0.03).

Figure 2 describes the type and characteristics of perpetrators of weight discrimination. Overwhelmingly, weight discrimination was experienced more often in adulthood (76.3%) and was most often of a verbal nature (76.3% of the time). Most of the perpetrators were adult men. **Figure 3** presents the differences in lengths of program adherence in discriminated versus non-discriminated groups. Although there were no significant differences in treatment time between groups (no wgt dis: 4.3 months; wgt dis: 2.8 months, p=0.23), the general pattern was for adherence to decrease with time; at the end of one month, significantly more of the discriminated group remained in the program (no wgt dis: 22.2%; wgt dis: 46.2%). However, at 6 months of follow-up, this pattern gradually reversed in favor of the non-discriminated group (no wgt dis:

3.7%; wgt dis: 1.1%). In a general linear model predicting adherence, weight discrimination was inversely related to treatment time, but non-significantly. Only age was significantly related to treatment time (adherence) in the adjusted and unadjusted models (**Table 2**).

DISCUSSION

Our study was novel in that no study to date has assessed the relationship between weight stigma and discrimination on adherence to a clinical weight loss program. Primary results from the study suggest that although weight discrimination was common (77.5%), it was not an independent predictor of program adherence when covariates were accounted for.

In this study, a number of factors related to program adherence were examined, and may account in part for the lack of effect with weight discrimination. Overall, patients with a history of weight discrimination were found to be younger by an average of ~12 years and were more likely to be current or past smokers (34.9% vs. 7.7%). In a U.S. population study by Puhl et al. (41), 10.3% of women and 4.9% of men had experienced weight discrimination during their lifetime, with differing patterns by age. Although our findings are consistent with another clinic-based sample (42) that reported a -0.43 correlation between age and stigmatizing experiences, we were not sufficiently powered to stratify our analyses by sex. With respect to smoking, no previous literature has observed a difference in weight-related discrimination; however, we cannot exclude the possibility that this effect could be mediated by psychosocial stress (43, 44). When we conducted a logistic regression as a post-hoc analysis, only age (OR=0.93, 95% CI: 0.86-0.99) and being a current smoker (OR=7.91, 1.20-161.48) were related to weight discrimination once adjusted for age, sex, BMI, ethnicity, and smoking (results not shown).

Although the clinic sample was relatively homogeneous, there was a trend towards more White individuals experiencing greater weight discrimination (97.1% vs 90.9%). In a study by Dutton et al. (45), perceived weight discrimination varied significantly by age and ethnicity (14.9% for African- American men, 24.6% for African- American women, 12% for white men, and 30.2% for white women). Indeed, it is reported that white women are under more pressure to achieve unrealistic body weight and they also express higher levels of body dissatisfaction than men (46). Taken together, these differences support the sociological finding of differences in preference for body size amongst different cultures.

In line with previous work suggesting that weight stigma is related to physical activity avoidance (47), 59.1% of non-discriminated group versus 38% of discriminated group in our study reported regular activity. However, no relationship between weight stigma and BMI was observed in our study. Although our study was not adequately powered to detect sex differences, previous literature suggest that weight discrimination is both more common and related to greater health risk in women and people with higher BMI (41, 42). As described in a previous qualitative study (48), patients with weight stigma reported higher expectations for weight loss at study baseline.

Although some work has pointed to the importance of program adherence as a key determinant of weight loss success (49, 50), no study to date has extended this to include the effect of discrimination on program adherence. In a recent meta-analysis, practical difficulties, unsatisfactory results, psychological factors and type of treatment seem to play a crucial role in the patients' attrition (51). Our hypothesis was that those who experienced weight stigma would have a lower program adherence rate and drop out of the program sooner. This is due to the fact that individuals living with obesity and a history of weight stigma are less likely to attend and

adhere to medical screening and preventive procedures (mammography, pap smear, etc), in part due to an exacerbation of existing risk factors (52). Attrition (and non-adherence) to weight maintenance programs is generally high, and varies according to population, level of support, length of follow-up, and experimental design (randomized vs. observational study) and type of treatment (drugs, behavior, bariatric surgery). If future work can confirm a weight discrimination – adherence link, this would open up the opportunity for psychological supports as a missing piece of the physician-patient consultation process.

When generalized linear models were run, no significant association was found between weight discrimination and adherence (**Table 2**). In order to assess short-term adherence, we tracked the adherence for 6 months and compared it between the 2 groups (**Figure 3**). In so doing, we observed that within the first month, the percentage of people who stayed in the program is considerably higher; however, the gap narrowed during the following months and reversed in the sixth month, but never became statistically significant. This may be due to a small sample and high rate of attrition, which limited statistical power. Indeed, after six months there was only one person left in the program within each group (unadjusted OR, 95% CI: 1+ month 3.01 (1.17- 8.82), 2+month: 2.48 (0.855- 9.03), 3+ month 1.58 (0.53-5.83), 4+ month: 1.662 (0.500- 7.58), 5+ month: 1.02 (0.20- 5.21), 6+month: 0.283 (0.01-7.30) (**Figure 3**). This general (reversing) pattern may be due to the fact that patients with weight bias start the program more aggressively after having experienced previous set-backs with weight loss or weight maintenance. In our sample, those with weight discrimination had a 2.6% weight loss during an average of 2.8 months, which may be well below their expected weight loss within the clinic setting (34.42 %). This high expectation and less satisfactory results could contribute in higher attrition rate later on during the program (53). It can be speculated that this could contribute to

patient burn out and a willingness to use more desperate means to lose weight as compared to non-discriminated group. In fact, a previous study from the Wharton Clinic showed that the stigmatized group have greater weight loss expectations and tend to choose riskier procedures for weight loss which may ultimately be more effective to reach those expectations (54). On the other hand, the reversal of this trend might also represent a higher level of despair and discouragement among patients with a history of weight discrimination that may contribute to more attrition over time – an effect that may be mediated through unsatisfactory results (53), and ultimately contribute to a cycle of weight gain and loss.

STRENGTHS AND LIMITATIONS

Among the unique aspects of this study was that it was set within a publically-funded weight management clinic where all medical expenses are covered by the government health plan, which minimizes cost-related barriers to study participation. As a result, this study can be viewed as a model for a pragmatic trial – as it is more generalizable than typical weight-loss studies (i.e. randomized trials) that are largely comprised of participants who are more likely to adhere due to financial or program incentives – a major confounder of the outcome of adherence for this study. Nonetheless, a number of limitations to the current study must be considered. First, as this was a secondary analysis of an existing dataset, sample size might have been insufficient to investigate longer-term program adherence as the majority of the sample size discontinued by 6 months. This preliminary data is nonetheless useful for the planning of future, larger studies, that may inform program planning (e.g. psychological supports, realistic weight loss goals, and screening for weight discrimination) within the bariatric care setting. Second, the clients of WMC are largely comprised of white women who may not represent the broader

population of individuals with obesity within the clinic catchment in the Greater Toronto Hamilton Area. Third, we were unable to assess duration of obesity, mental health status, or key psychological factors such as motivation that may mediate the relationship between weight discrimination and program adherence. Finally, our weight discrimination outcome was comprised of individual questions and did not follow the detailed assessment of known questionnaires such as Stigmatizing Situation Inventory (SSI) (55) or Weight Bias Internalization Scale (WBIS) (56) that allow for a composite assessment of stigma intensity across multiple domains.

CONCLUSION

In summary, results from this study provide preliminary insight into the relationship between weight discrimination and program adherence. Although the majority of clinic patients had a history of weight discrimination, program adherence was in general very low, and weight discrimination was only related to short-term adherence (1+ month) in unadjusted analyses. Future work is needed to assess this relationship in larger clinic samples to better understand the impact of weight discrimination on program adherence in a community-based health care setting.

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3.0. EXTENDED DISCUSSION

Overweight and obesity is a globally increasing problem, and most existing weight loss programs have only limited long-term success. Along with obesity, weight stigma and discrimination are also growing. To our knowledge this is the first study to assess the relationship between weight stigma and adherence to weight loss programs in a clinical setting. This work is important, given that adherence to weight loss programs is a core factor that determines weight loss success.

Study Limitations and Sources of Bias:

Measure of Weight Stigma / Discrimination:

Despite the many strengths of this thesis, there are a number of important limitations that warrant discussion. Most notably, the structure of our questionnaire along with the limited number of participants prevented us from assessing of the potential for a dose-response relationship between intensity of weight discrimination and program adherence. In our survey, weight discrimination was evaluated as a yes/no response to the question: “*Have you ever experienced weight discrimination, or had a negative experience because of your weight?*”. This is different from other measurements dedicated to the assessment of weight stigma, including the Stigmatizing Situations Inventory (SSI) or Weight Bias Internalization Scale (WBIS) (1, 2). For example, the SSI is the most common questionnaire in the field of weight bias and discrimination, and was invented in 1999 by Myers and Rosen to assess the frequency of different stigmatizing situations faced by those living with obesity, coping strategies that they choose, and the relationship between the coping strategy and psychological distress. In addition to considering the severity of the experience, the SSI allows the researcher to consider the

commonality of a stigmatizing situation as a positive answer and rank the less common forms as a negative one. For example, in questionnaires that query the frequency of the stigmatizing events, researchers would have greater control over the response patterns and could choose to exclude “rarely” or “once in your life” and consider them as a “no” answer. In our questionnaire, however, any experience of weight discrimination that had occurred in the participant’s lifetime was considered a positive point. Because of the initial purpose of our questionnaire, it also included a number of questions related to the patients’ thoughts regarding the original cause of their obesity problem, the method they think would work to solve their problem, their goal weight, their perception of a realistic weight loss, and their opinions regarding weight loss or being healthy (see Appendix A). In the discrimination section, after a participant reported a positive response, s/he would then be asked some more details regarding the nature of the experience (verbal, physical, discrimination, physical barrier, other), the time at which the discrimination was experienced (childhood, adolescence, adulthood), age and gender of the perpetrator, their relation to the participant, and the location of the event. Unfortunately, the part of the questionnaire with detailed physical activity information was mostly skipped by the participants, and we were ultimately not able to conduct any meaningful analyses.

Confounding Bias:

In an attempt to limit the influence of confounders, our analysis was adjusted for age, sex, BMI, physical activity and smoking. Each of these factors were found in different studies to have affected patients’ attrition; however, there were also some other factors that could be influencing patients’ adherence to the programs that we didn’t have any information for, including: practical difficulties of the patients to attend the clinic for a long time, patients’ motivation to lose weight, age at onset of obesity and age at first dieting, occupational status, dietary habits, high weight

loss expectations, unsatisfactory results, and poor mental status. Many of these factors have been shown to have contradictory effects on the patients' program continuation, and because this study was a secondary analysis of existing data, we were unable to fully account for all of these factors.

Selection Bias and Ethics:

In this study participants were selected from clinic patients who attended the WMC for the first time in June, 2010. All the first time patients during that time period had equal chance to fill out the questionnaire and return it to the clinic personnel; however, for this specific questionnaire they were informed that it was optional to fill out and that the patient's choice to participate or not in the research would not affect their treatment in the clinic. Because of this, we are unable to calculate the true participation rate of those who were eligible to complete the questionnaire. Since the questionnaire was retrieving the patients' experiences of weight discrimination, it is also possible that this group of patients chose to participate while the other group did not see the subject as important. If true, this would result in a higher than expected rate of weight discrimination in the study sample. However, all the patients with and without weight discrimination underwent the similar treatment procedure and the same measurement of outcome which was the treatment time for adherence determination.

External Validity:

All participants were drawn from Greater Toronto Area and Hamilton and were referred by their family doctor to the clinic, with costs of the treatment covered by OHIP. Because of potential differences in self-selection and referral patterns, this sample cannot be generalized to the broader population of Canadians living with obesity.

Sample Size Considerations:

Sample size was another major area of concern in our study, and the non-significant difference of treatment time of patients with vs. without a history of weight discrimination might be due to insufficient power. Sample size constraints also prevented us from exploring the metabolic consequences of weight discrimination which were originally proposed as a third study objective.

Bradford Hill's Criteria for Causation:

Bradford Hill's criteria for causation are often used to build evidence towards causality when “gold standard” studies, such as RCTs, are not available. The following section discusses key aspects of Hills' Criteria to which this study adds.

Strength of Association: Although the relationship between weight stigma and adherence did not reach statistical significance, the results provide important insight into the patterns of exposure and provide the basis for future work.

Temporality: Because our weight discrimination questions assessed the “timing” of discrimination, we can be sure that the exposure preceded enrollment in the Clinic.

Dose-Response: Due to the fact that our discrimination questions did not assess perceived severity of exposure, we were unable to provide any insight into the dose-response relationship.

Consistency: Results from this study provide preliminary insight and agreement with the broader literature that shows that individuals who are stigmatized refuse health services, some screening and preventive procedures, and participate in less physical activity. Findings from our study must be expanded to include a larger and more diverse sample, to explore both age and sex differences in the proposed relationship.

Plausibility: A number of plausible “mechanisms” could contribute to a relationship between weight discrimination and adherence. These include: avoidance of medical services as an isolation measure, higher weight loss goals, and unsatisfactory results, among other factors. Future work must examine the potential for psychological counselling (and other interventions) at the outset of clinic enrollment to help patients set realistic weight loss goals and provide support for program adherence.

Specificity: Although there are many different factors related to patient’s adherence (see Grave et al.; Figure 1), weight adherence is one pathway which a number of pre-treatment and (in) treatment factors may be linked.

Coherence: If further analyses support a relationship between weight discrimination and adherence, it would align with the current understanding that individuals living with obesity who experience weight discrimination may have greater difficulty adhering to lifestyle-based obesity management programs.

Implications and Future Directions:

It has been shown that patients with obesity who perceived weight discrimination have shorter life expectancy and a higher rate of mortality (3). At this time, it is not clear whether weight stigma puts patients in a vicious cycle of obesity (4, 5) or if there are other important mediators of the proposed relationship. It seems reasonable that future research should determine the long-term health conditions of these patients and their experiences regarding the results of the weight management programs years after they leave the program.

On the one hand, weight discrimination could encourage a certain subset of patients to lose weight and increase their motivation for weight loss attempts; on the other hand, for the majority of the population, it may have a range of indirect (physical and psychological) health

effects. Indeed, individuals with overweight and obesity are perceived to be lazy and less intelligent, as they were unable to overcome the problem of obesity to be “healthy” (6). These and other questions await further study, in order to more completely understand the wide-ranging implications for public policy and a society free of discrimination (7).

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Table 1. Baseline Characteristics of the Sample

| | Overall Sample N=120 | No Weight Discrimination N=27 (22.5%) | History of Weight Discrimination N=93 (77.5%) | P-value |
|-------------------------------|------------------------------------|---|---|-------------------|
| Age, yr | 47.2±12.2 | 56.4±11.2 | 44.6± 11.3 | <0.0001 |
| Sex, %F | 83.3% | 81.5% | 83.9% | 0.76 |
| Ethnicity (% White) | 95.7% | 90.9% | 97.1% | 0.07 [†] |
| BMI, Kg/m ² | 39.9±6.9 | 38.5± 6.6 | 40.3± 6.9 | 0.26 |
| Smoking status (% current) | 30.3% | 7.7% | 34.9% | 0.04 |
| Can walk 4 miles (%) | 18.9% | 11.5% | 21.2% | 0.27 |
| Current physical activity (%) | 43.0% | 59.1% | 38.0% | 0.08 [†] |
| Blood Pressure Medication (%) | 29.7% | 23.8% | 31.2% | 0.56 |
| Waist Circumference | 120.6±14.5 | 119.7± 13.0 | 120.8± 14.8 | 0.79 |
| Weight Loss (%) | -2.4±3.6 | -1.7± 2.7 | -2.6± 3.8 | 0.42 |
| 5% Weight Loss | 24.7% | 25.0% | 24.6% | 0.98 |
| 10% Weight Loss | 2.7% | 3.3% | 0.0% | 0.52 |
| Treatment time (weeks) | 12.9±16.8 | 18.2± 35.9 | 11.9± 9.9 | 0.23 |
| Weight Loss Rate (kg/wk) | -0.3±0.3 | -0.2± 0.3 | -0.3± 0.3 | 0.32 |
| Cardiovascular Disease (%) | 1.2% | 0.0% | 1.5% | 0.61 |
| Treatment time (months) | 3.0±3.9 | 4.3± 8.4 | 2.8± 2.3 | 0.23 |
| Initial wgt (kg) | 110.2±21.2 | 104.7± 18.2 | 111.6± 21.7 | 0.24 |
| Final wgt (kg) | 109.3±20.8 | 105.9± 16.4 | 110.0± 21.6 | 0.53 |
| Wgt Loss (lb) | -5.9±9.1 | -4.0± 6.3 | -6.3± 9.6 | 0.43 |
| Wgt Loss (kg) | -2.7±4.2 | -1.8± 2.9 | -2.8± 4.4 | 0.43 |
| Weight loss goal (lb) | 82.8± 36.8 | 67.3± 27.3 | 87.1± 38.1 | 0.02 |

| | | | | |
|----------------------|-------------|-------------|--------------|-------------|
| Weight loss goal (%) | 33.35± 9.97 | 29.49± 8.19 | 34.42± 10.20 | 0.03 |
|----------------------|-------------|-------------|--------------|-------------|

Values are $\bar{x} \pm \text{SD}$ or %; bold indicates $P < 0.05$ between weight discrimination vs no weight discrimination groups;

[†]indicates a trend ($0.5 < p < 0.10$)

Table 2. Beta coefficient and P-value for individual covariates (model 1) and adjusted models (model 2).

Bold indicates $p < 0.05$

| | Model 1 | | | Model 2 | | |
|-----------------------|------------------|--------------|-------------|------------------|--------------|-------------|
| | Beta-Coefficient | P-value | 95% CI | Beta-Coefficient | P-value | 95% CI |
| Weight Discrimination | -1.479 | 0.235 | -3.95, 0.99 | -0.751 | 0.653 | -4.08, 2.58 |
| BMI | 0.019 | 0.781 | -0.11, 0.15 | 0.026 | 0.742 | -0.13, 0.18 |
| Age | 0.090 | 0.015 | 0.02, 0.16 | 0.11 | 0.029 | 0.01, 0.21 |
| Sex | 1.917 | 0.172 | -0.85, 4.69 | 1.268 | 0.499 | -2.47, 5.01 |
| Current PA | -0.271 | 0.815 | -2.58, 2.04 | 0.322 | 0.781 | -2.63, 1.99 |
| Current smoker | -0.166 | 0.878 | -2.31, 1.98 | 0.847 | 0.543 | -1.93, 3.62 |

Figure 2. Type and Characteristics of Perpetrators of Weight Discrimination.

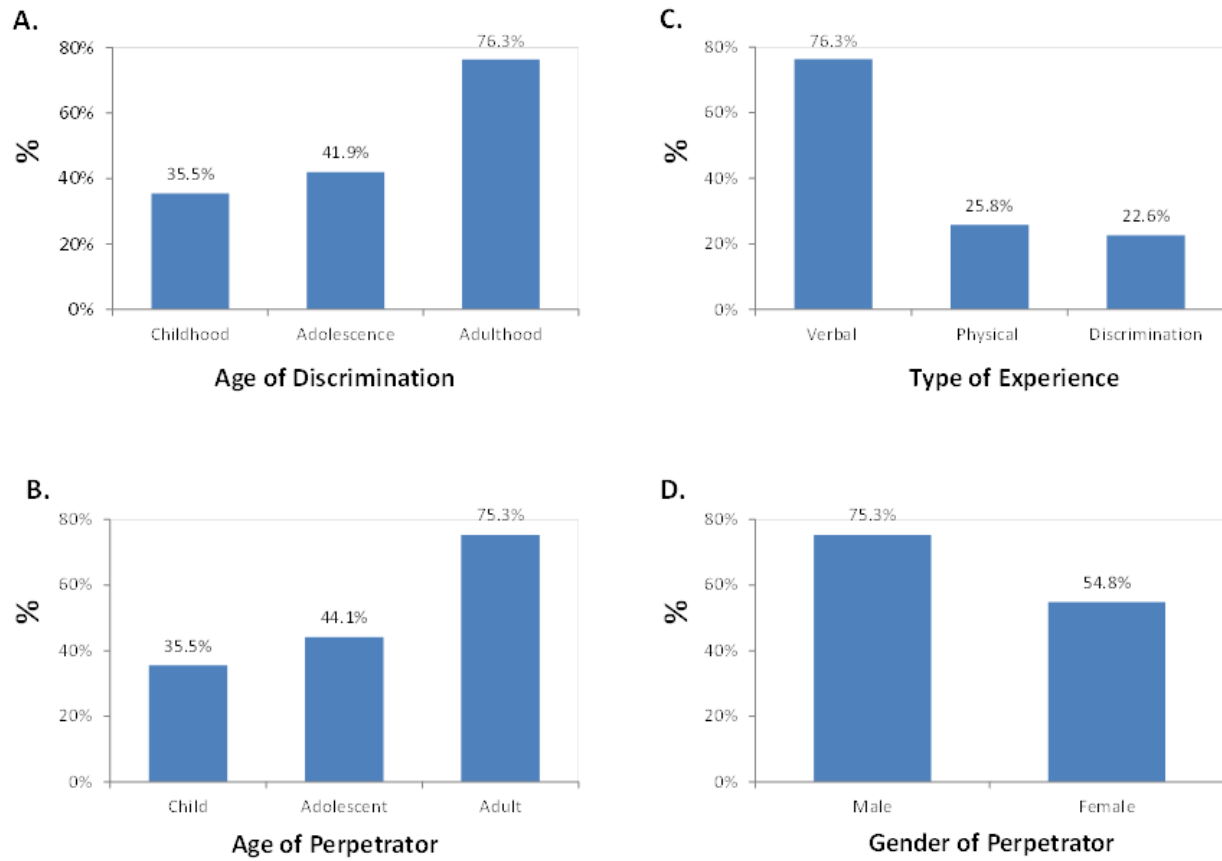
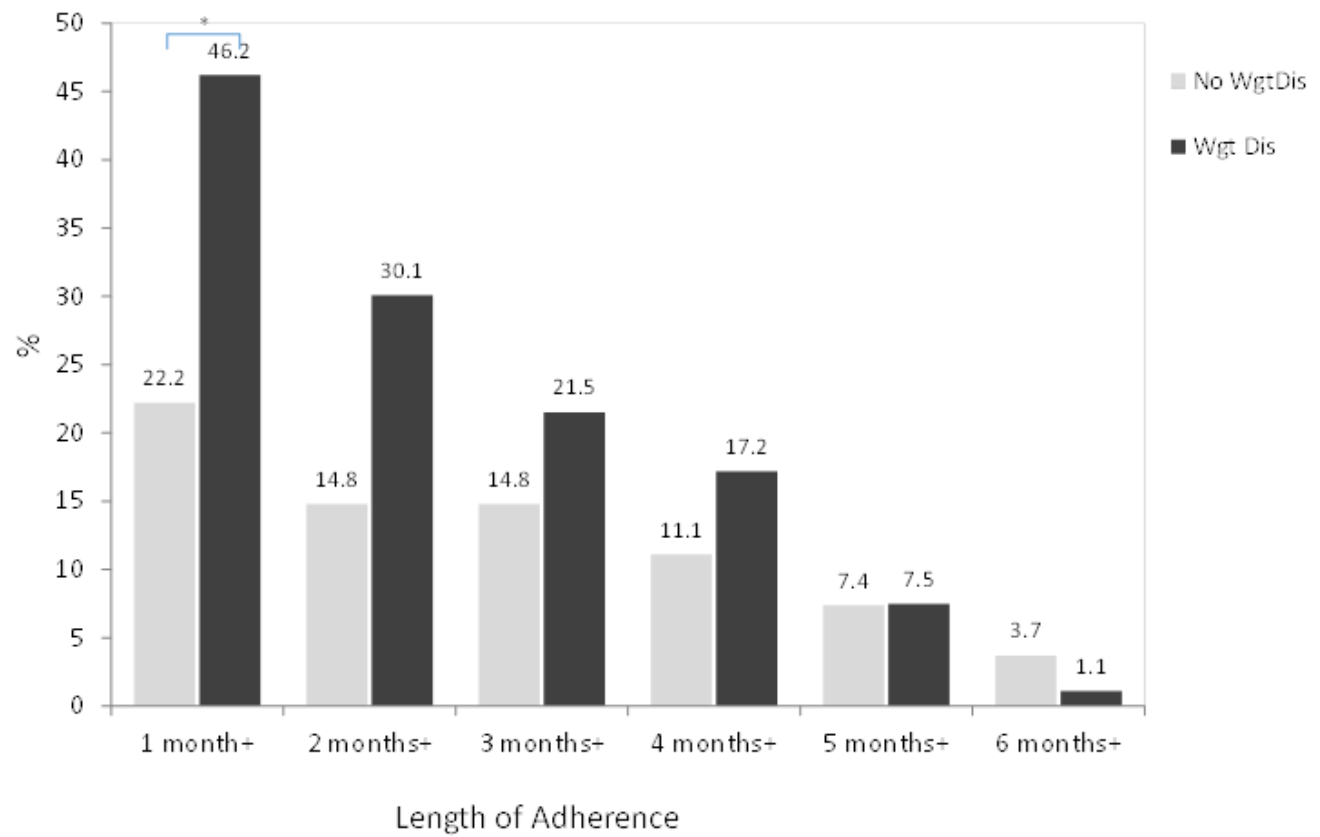


Figure 3. Difference in Adherence according to History of Weight Discrimination



*p<0.05 between weight discrimination groups; Chi-Square analysis

4.0. APPENDICES

Appendix A- Questionnaire

Name: _____ Date: _____

Ethnicity: _____ Sex: M / F (Please circle)

How long have you attended the Wharton Medical Clinic? _____

Why do you think you have a weight problem? (Rank the top 3, with 1 being the most important)

___ Over Eating ___ High Fat Diet ___ Junk Food
___ Not Physically Active ___ Genetics ___ Environment
___ Lack of Will Power ___ Medical Condition (ie. Thyroid, depression drugs, etc.)
___ Other (specify): _____

How much would you ideally like to weigh (ie. goal weight)? _____

How long do you think it would take for you to attain that weight loss? _____

How much weight loss do you think is realistic? _____

How long do you think it would take for you to attain that weight loss? _____

What is the minimal weight loss that you would be satisfied with? _____

How long do you think it would take for you to attain that weight loss? _____

Do you think you need to lose weight to become healthy? Y N

If so, how much weight do you need to lose? _____

What do you think you need to do to achieve your goal weight loss? (Rank the top 3, with 1 being the most important)

- | | | |
|---|---|--|
| <input type="checkbox"/> Eat Less | <input type="checkbox"/> Eat Better Food | <input type="checkbox"/> Meal Replacement |
| <input type="checkbox"/> More Physical Activity | <input type="checkbox"/> Genetic Modification | <input type="checkbox"/> More Will Power |
| <input type="checkbox"/> Surgery | <input type="checkbox"/> Weight Loss Drugs | <input type="checkbox"/> Weight Loss Supplements |
| <input type="checkbox"/> Other (specify): _____ | | |

Would you be satisfied with a small weight loss (ie. 5%) if your health and function was improved?

Strongly Agree Agree Neutral Disagree Strongly Disagree

Would you be satisfied with a small weight loss (ie. 5%) if your health and function was normalized?

Strongly Agree Agree Neutral Disagree Strongly Disagree

If there was a pill that could permanently cure you of your weight problem tomorrow without dieting, exercise or surgery, how much would you be willing to pay for it? \$ _____

Would you be willing to experience any of the following conditions or events if it meant you could be normal weight?

- | | | | |
|-------|--------------------------------|-------|----------------------------------|
| Y N | Blind | Y N | Severe Heart Disease |
| Y N | Paraplegic (Can't walk) | Y N | Never eat your favourite foods |
| Y N | Exercise for 1-2 hours per day | Y N | Life Sentence in Jail |
| Y N | Have only 5 more years to live | Y N | Live 20 years less than expected |

Would you be willing to stay at your current weight if it meant you could:

- | | |
|-------|---|
| Y N | Be completely healthy (disease free) and fully functional |
| Y N | Be a millionaire/win the lottery |
| Y N | Be famous |
| Y N | Live forever |

Have you ever experienced weight discrimination, or had a negative experience because of your weight?
Y N

If yes, please answer the following questions. (Circle All that apply, and Star the answer in regards to your worst experience).

When did it happen to you? *Childhood* *Adolescence* *Adulthood*

Type of experience: *Verbal* *PhysicalDiscrimination*

Physical Barrier (i.e. inappropriate seats, etc.) *Other:* _____

Age of the perpetrator: *Child* *Adolescent* *Adult* *N/A*

Gender of the perpetrator: *Male* *Female* *N/A*

Their relation to you: *Peer/Friend* *Boyfriend/Girlfriend* *Parent*
Child *Spouse* *Sibling* *Other Family*
Stranger *Physician* *Nurse* *Other Health Professional*
Boss/Supervisor *Teacher/Professor* *Other:* _____

Location: *Home* *Work* *Medical Facility* *Public Place* *Mode*
Transportation *School* *Other:* _____

Physical activity and sedentary time:

What would you consider your **current** physical activity level to be:

Very Active *Moderately Active* *Average* *Below Average* *Very Poor*

Are you satisfied with the level of your physical activity? Y N

How important was a change in physical activity in development of your obesity?

Not at all Important Somewhat Important Neutral Important Very Important

Can you currently walk 4 miles briskly without fatigue? Y N

Do you intend to change your physical activity in the next few months? Y N

Do you have injuries or pain that may interfere with regular physical activity? Y N

During the week, how many hours per day do you usually spend watching TV shows or videos?

*I don't watch TV or videos Less than 1 hour a day 1-2 hours a day
3-4 hours a day More than 4 hours a day*

During the weekend, how many hours per day do you usually spend watching TV shows or videos?

*I don't watch TV or videos Less than 1 hour a day 1-2 hours a day
3-4 hours a day More than 4 hours a day*

During the week, how many hours per day do you usually use the computer to surf the Internet or Play video games?

*I don't play video games or use the computer Less than 1 hour a day
1-2 hours a day 3-4 hours a day More than 4 hours a day*

During the weekend, how many hours per day do you usually use the computer to surf the Internet or play video games?

*I don't play video games or use the computer Less than 1 hour a day
1-2 hours a day 3-4 hours a day More than 4 hours a day*

Diet History:

Rate your current diet

Very Poor

Poor

Average

Good

Very Good

How often do you eat breakfast?

7 days per week

5-6 days per week

3-4 days per week

1-2 days per week

I do not eat breakfast

How often do you eat after 8 o'clock in the evening?

Regularly

Occasionally

Never

Check if you eat (check all that apply):

While cooking

In the middle of the night

While watching TV

While reading

When angry or depressed

When bored

In the car